only later become thoroughly understood, and after this their applications become apparent in the systematic study of the elements. There are also represented in text books many compromises between the two methods.

In the work under consideration the author has pursued the second course. We believe Professor McGregory is right in using this method, especially for college students. The general idea of the Atomic Theory is perhaps difficult to grasp, but with a knowledge of it the after-work becomes much simpler and clearer, and indeed it is questionable if it be not easier to grasp the Atomic Theory before the mind has become obscured by a study of mass reactions.

The book does well what it attempts. With it in hand the student can give close attention to the lectures of the instructor, not losing important points in the effort to take notes, resting assured that all the essentials are to be found in the "Lecture Notes." At the same time the book is not burdened with descriptions of experiments, telling the student what he ought to see. The student should be expected to write out for himself what he sees in the experiment, thus affording the instructor an opportunity of judging his work, and of setting him right when he is astray.

The book is brought well down to date, and adopts the spelling of chemical terms recommended by the American Association for the Advancement of Science, and used by the new Standard Dictionary.

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Elementary Algebra. By C. SMITH. Revised and adapted to American schools, by IRVING STRINGHAM, Ph. D., Professor of Mathematics in California University. Macmillan & Co., London and New York ; pp. 408. Price $1.10.

Mr. Smith's algebras are among the best in the English language. His Elementary Algebra has been before the public for some time, and has been very favorably criticised.

Among the many excellencies of this American edition, are the introductory lessons by Professor Stringham. These are intended to form a natural bridge between arithmetic and algebra. Factoring is made prominent, and is considered fundamental in solving equations of higher degree. The explanations are, for the most part, clear and abundant, though not always direct and concise. Subtraction and division are made

easy by regarding these processes as the reverse of addition and multiplication respectively.

In some ways, however, this algebra does not satisfy the demands of the best teachers. The first, and possibly the most objectionable fault, is the point of view from which algebra is treated. Algebra is defined as "that branch of mathmematics which treats of the relations of numbers as expressed in equations, and in what are known as algebraic forms, or expressions." Equations are distinguished from identities. Now there is no serious objection to this definition, unless it is that it does not make the equation as an instrument of investigation sufficiently clear and prominent. In concise terms, algebra is "the science of the equation." Yet, in this text, particularly in the introductory lessons, algebra is regarded as generalized arithmetic, that is, in arithmetic figures are used to express number, in algebra figures and letters ; in arithmetic positive quantities only are considered, in algebra both positive and negative.

These are incorrect, although very prevalent views. Arithmetic may be made as general as we please, and still remain arithmetic. The first thirteen pages are not algebra, because letters are used to express number, but because these examples illustrate (in a simple way) the use of the equation.

When the paragraph "Negative numbers" is reached, then for the first time the pupil meets the idea of quality. Algebra must consider this, for no extended use of the equation is possible without involving it. Fractions, factoring, exponents, etc., must be studied for the same reason.

Arithmetic deals with all numbers unmodified by the idea of quality. The numbers in arithmetic are neither positive nor negative. To speak of an arithmetical number as positive, is inaccurate, for the very concept of a positive quantity involves negative quantity.

There seems to be some confusion in regard to what represents algebraic quantity. "In algebra numbers are represented either by figures or by the letters of the alphabet." A figure cannot represent quality unless a sign is written or understood with it, and algebraic number involves quality.

A *letter* may stand for both quantity and quality, and therefore represents an algebraic number. Yet this seems to be denied by another paragraph which says: "A quantity to which the sign + is prefixed is called a *positive quantity*, and a

quantity to which the sign — is prefixed is called a *negative quantity.*"

To subtract one quantity from another we are taught to change the signs of the terms in the subtrahend, and then proceed as in addition, but the "Law of Signs" has not yet been proved, and hence the fact that changing the sign of one factor changes the sign of the product, has to be assumed.

Equivalent equations are treated very meagerly. For example, the equation $\sqrt{2x+8}-2\sqrt{x+5}=2$ is solved, and $+4$ and -4 are found to be the roots. When these roots are substituted in the given equation, each one of them fails to prove. This is explained by saying that before every radical expression both + and — should be understood, and in this particular case the negative should be used. I suppose this means that the equation really solved is $-\sqrt{2x+8}+2\sqrt{x+5}=2$. What then shall we do with the equation $+\sqrt{2x+8}-2\sqrt{x+5}=2$? One would naturally think that the method that solves the first ought to solve the second. In any given equation the root or roots, if any, are definite and certain, and in solving this equation the pupil ought to know at every step whether he is introducing or eliminating any root, that is, whether his derived equation is precisely equivalent to the original, and if it is not, wherein it is not.

The same remarks might be applied to systems of equations. Every such system has certain sets of values which satisfy the equations. and in all the operations necessary to obtain these sets, we should pass from one system to an *equivalent* system, or if any change in the roots is made we should know just where and what it is. The subject of equivalent systems of equations is not treated in this text.

There is in this work a tendency to use two terms or two definitions where one would be sufficient. For example, "Index or exponent," "degree or dimension," "identical equations or identities," and two definitions of a fraction. Such repetitions in rare instances may add a little to clearness if one is already somewhat familiar with algebra, but usually they are confusing and burdensome to those going over the ground for the first time. In the case of fractions it will seem to many teachers that an unnecessary element of mystery is involved, and that a student would feel more at home if taught to regard the fraction as an indicated division—the dividend above and the divisor below the horizontal line.

There are over two thousand exercises, called "examples," and only about three hundred practical "problems."

The algebra covers about the same ground as usual, yet with a more than ordinary degree of thoroughness. Chap. XIII., which treats of "mathematical induction," "symmetry," and "cyclosymmetry," is not always found in an elementary work. Horner's synthetic division is emphasized. There is, however, no treatment of cube root, logarithms, theory of limits, or the binomial theorem for fractional and negative indices.

Colgate University. *S. L. Howe*

NOTES

James E. Russell, (Ph. D. Leipsic,) formerly of the editorial staff of THE SCHOOL REVIEW, and still a highly valued contributor, has been appointed to the chair of Philosophy and Pedagogy in the State University of Colorado, Boulder, Col. Dr. Russell took his degree at Leipsic this winter, passing an exceptionally brilliant examination. By his appointment Colorado and the West gain the services of one of the best trained and most enthusiastic workers in the field of pedagogics.

Ginn & Co. announce for publication this spring a series of biological lectures delivered at Wood's Holl, in 1894. The lectures cover a wide range of subjects, and will for the most part be easily followed by the general reader.

Fiske's History of the United States for Schools contains a picturesque portrait of Joseph Brant, the most remarkable Indian known to history. Mr. Fiske says of him: "He was well educated, a devout member of the Episcopal Church, and translated the Prayer Book and parts of the New Testament into the Mohawk language. This combination in him of missionary and war-chief was quite curious."

Houghton, Mifflin & Co., of Boston, New York, and Chicago, will shortly publish as Number 73 of their Riverside Literature Series (paper covers 15 cents) a collection of Tennyson's poems under the title, *Enoch Arden, and Other Poems*. Besides the title poem, the book contains The Day-Dream, Dora, The Talking Oak, Sea-Dreams, Ode on the Death of the Duke of Wellington, Ulysses, The Charge of the Light Brigade, Lady Clare, The Death of the Old Year, Crossing the Bar, etc. There is also an excellent biographical sketch.

Gibbon's Memoirs. Edited with an introduction and notes by Oliver Far rar Emerson, A. M., Ph. D., Assistant Professor of Rhetoric and English Philology in Cornell University, will soon appear from the press of Ginn & Co. *Gibbon's Memoirs* of his literary life presents in a plain but remarkable story the account of the author's devotion to scholarship, and his "long sacrifice to the purest intellectual enthusiasm." "Gibbon is," says Edmund Gosse, "a typical specimen of the courage and single-heartedness of a great man of letters." Hitherto, however, the *Memoirs* have been inaccessible in